PROTO-NEOLITHIC CAVES IN THE BOLAGHI VALLEY, SOUTH IRAN

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Abstract
The Eastern Zagros region has not previously been considered in the study of Neolithisation in the Near East. Our recent research, which was carried out as one of the salvage projects in the Bolaghi valley, Fars, sheds new light in this area. Two cave sites were excavated and both sites produced a considerable amount of lithic artefacts. They show a coherent assemblage which appears to date to some point within the "Proto-Neolithic" framework of the Zagros region. Though the subsistence remains have not yet been fully studied, our evidence may bridge the hiatus between the end of the Epi-Paleolithic and the beginning of the Pottery Neolithic in the Eastern Zagros.

Keywords
Proto-Neolithic; Eastern Zagros; the Bolaghi valley; lithic artefacts; Neolithisation.

I. INTRODUCTION

The study of the transition from the Epi-Palaeolithic to the Neolithic is very significant in human history because it deals with the shift from food gathering to food producing societies. Most of the archaeological research on this transition has been carried out along the hillsides of the Fertile Crescent in the Levant, southern Anatolia, northern Mesopotamia, and the western Zagros Mountains, and areas peripheral to this have received little attention. Although the natural environment is not so different from that of the western Zagros, the eastern Zagros Mountains is one of these latter areas. Many Epi-Palaeolithic caves and shelters and Pottery Neolithic settlements have been discovered and registered in Fars province, especially in the Marvdasht plain (e.g. Rosenberg 1985; 2003; Alizadeh 2006). However, sites dating between the Epi-Palaeolithic and Pottery Neolithic periods have not previously been reported. The fact that this transition era is still unknown in Fars province suggests that the eastern Zagros did not play a role in this transition. However, our recent investigations have revealed the existence of occupation that may date to this transitional phase in this region. We tentatively call this transitional period the "Proto-Neolithic". A suitable definition for this period in this region has not previously been proposed and here, this term is used to indicate a chronological phase and does not suggest the existence of domestication.

Our investigation was carried out as one of the salvage projects in the Sivand dam area (ICAR 2006). The new Sivand dam has been constructed at the southern end of Darr-ye Bolaghi, which is one of the small basins in the eastern Zagros Mountains. The dam site is about 30 km. north-east of Persepolis and about 12 km. south-west of Pasargadae (Fig. 1). A narrow valley, named Tang-i Bolaghi, and most of the other parts of this small basin will be flooded by the construction of this dam. Hereafter, we refer to both the valley and basin together as the Bolaghi valley. We carried out the first season's investigations from mid-July to the beginning of August 2005. Although we conducted some surveys during our first season of investigations, we report here only the operation of the excavations at two caves that produced relevant materials.

The sites within the dam area were initially surveyed and numbered by Mr 'Atai and ICAR from BV1 to BV129 ('Atai 2003; as directed by the Iranian Center for Archaeological Research the site codes have now been changed from BV to TB = Tang-i Bolaghi). Most of the sites were cairns, open-air sites, and sites with evidence of metallurgic activity, and date to the Achaemenian, Sasanian and early Islamic periods. Although some sites date back to the Chalcolithic period, very few prehistoric open-air sites were discovered. We concentrated our attention on the caves and shelters along the skirt of the surrounding mountains. Within the dam area many caves and shelters were recognised. Based on the results of our initial short visit, we chose two cave sites,

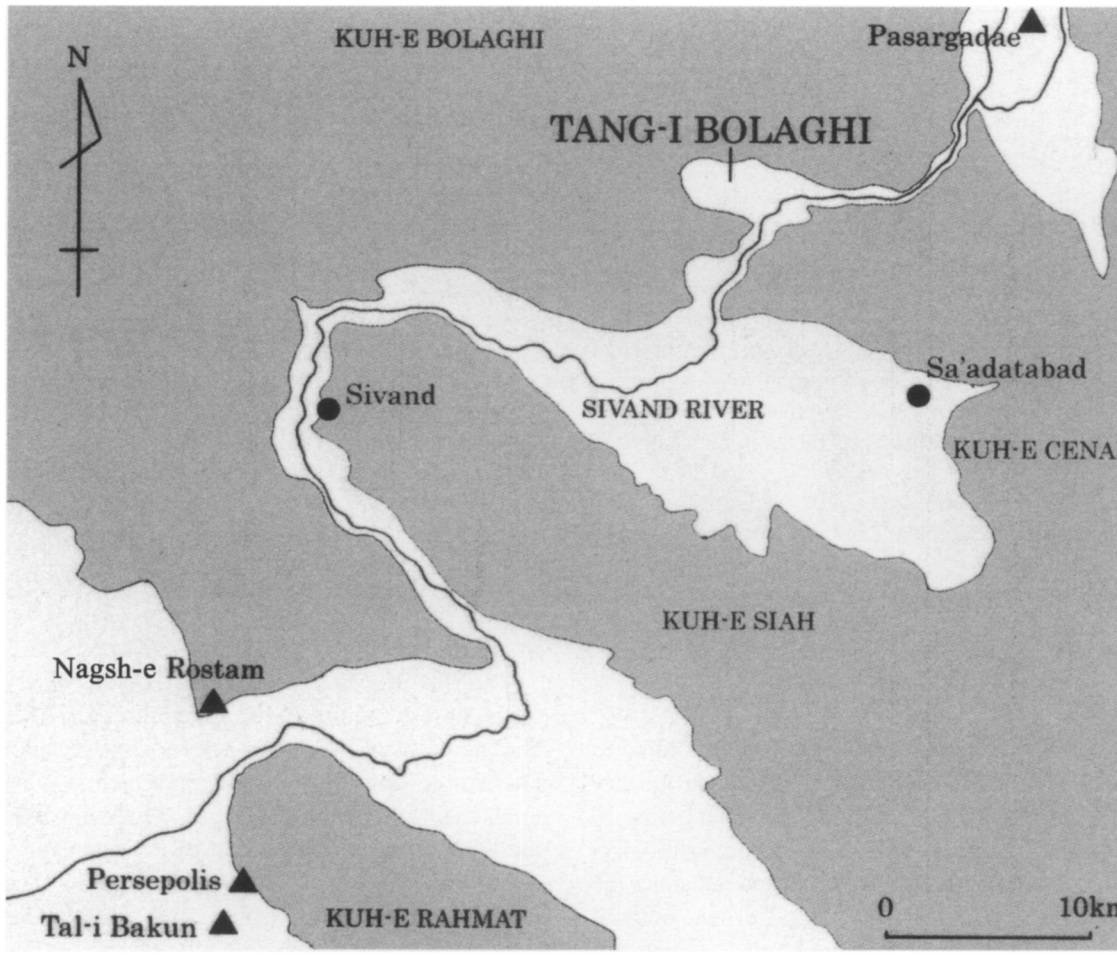

Fig. 1. Tang-i Bolaghi and its neighbouring area.

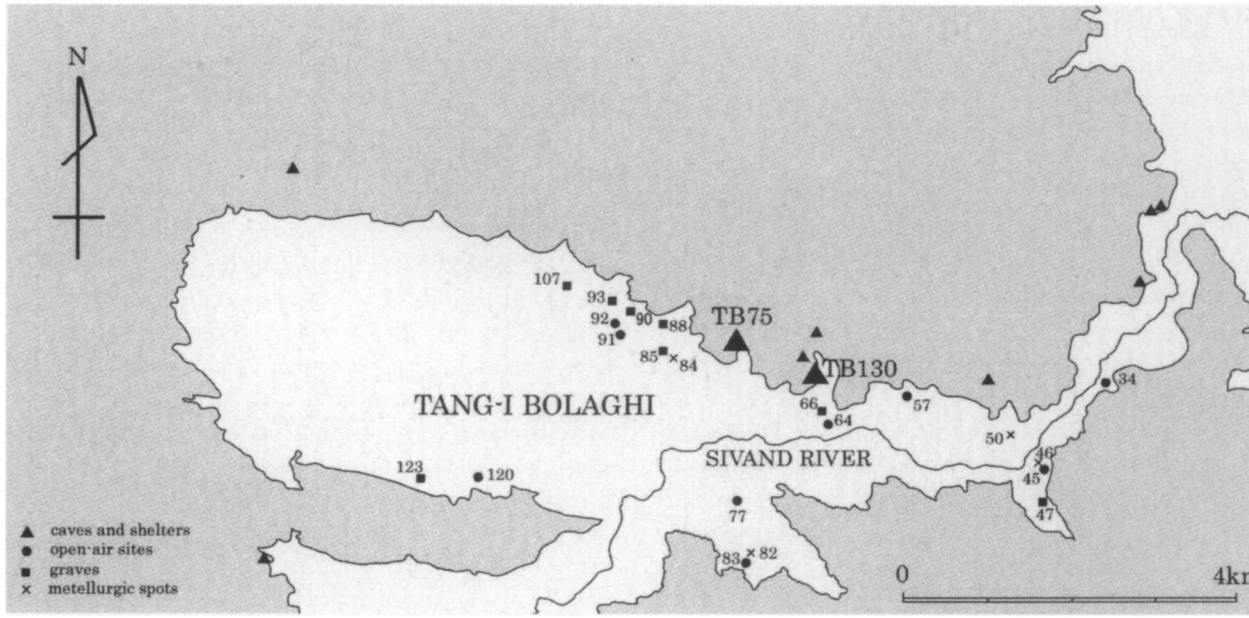

Fig. 2. Sivand dam salvage area, showing important archaeological sites (after 'Atai 2003).

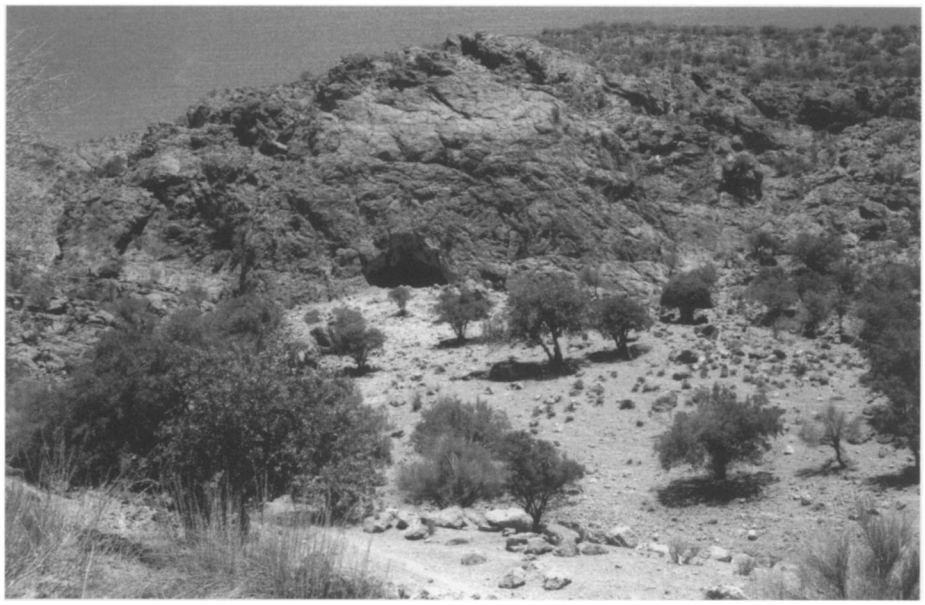

Fig. 3. Distant view of TB75.

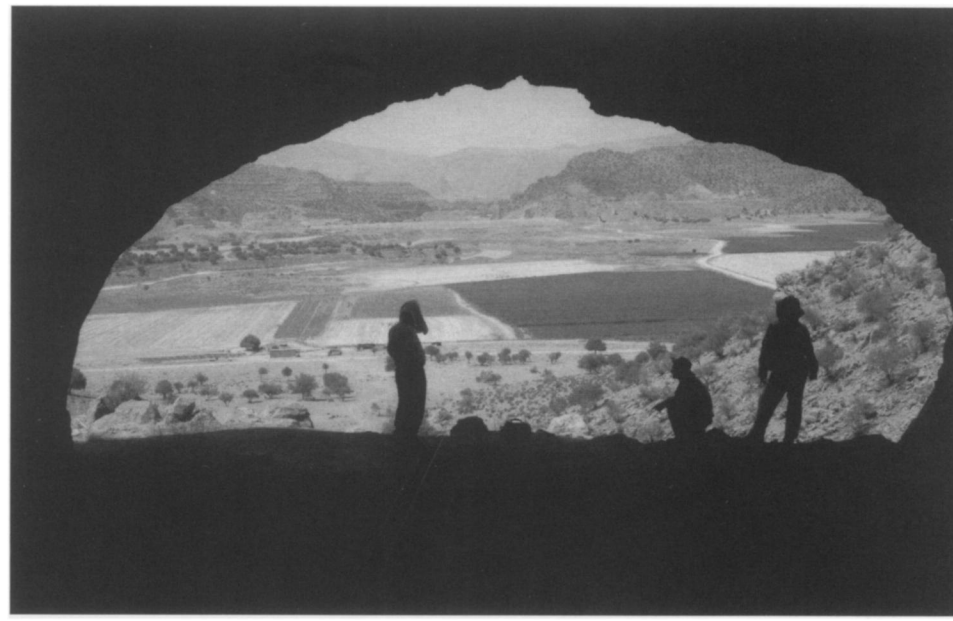

Fig. 4. Outlook from TB75.

TB75 and TB130, for the first season's excavations. Although TB75 was already known, TB130 is a newly discovered site that was identified by us. Both TB75 and TB130 are located on the southern slope of Kuh-e Bolaghi Bozorg, along the northern fringe of the Bolaghi Valley (Fig. 2). The distance between these sites is less than 2 km. The excavations unexpectedly produced fruitful results, and shed new light on the prehistory in the eastern Zagros region.

II. EXCAVATIONS AT SITE TB75 (ESHKAFT-E HAJI BAHRAMI)

Site TB75 is a limestone cave that opens to the south-west. The cave is known locally as Eshkaft-e Haji Bahrami. It is the most conspicuous cave in the Bolaghi valley, and comes into view immediately as you enter the valley from the south (Fig. 3). From the cave location, the central part of the Bolaghi valley is visible with a

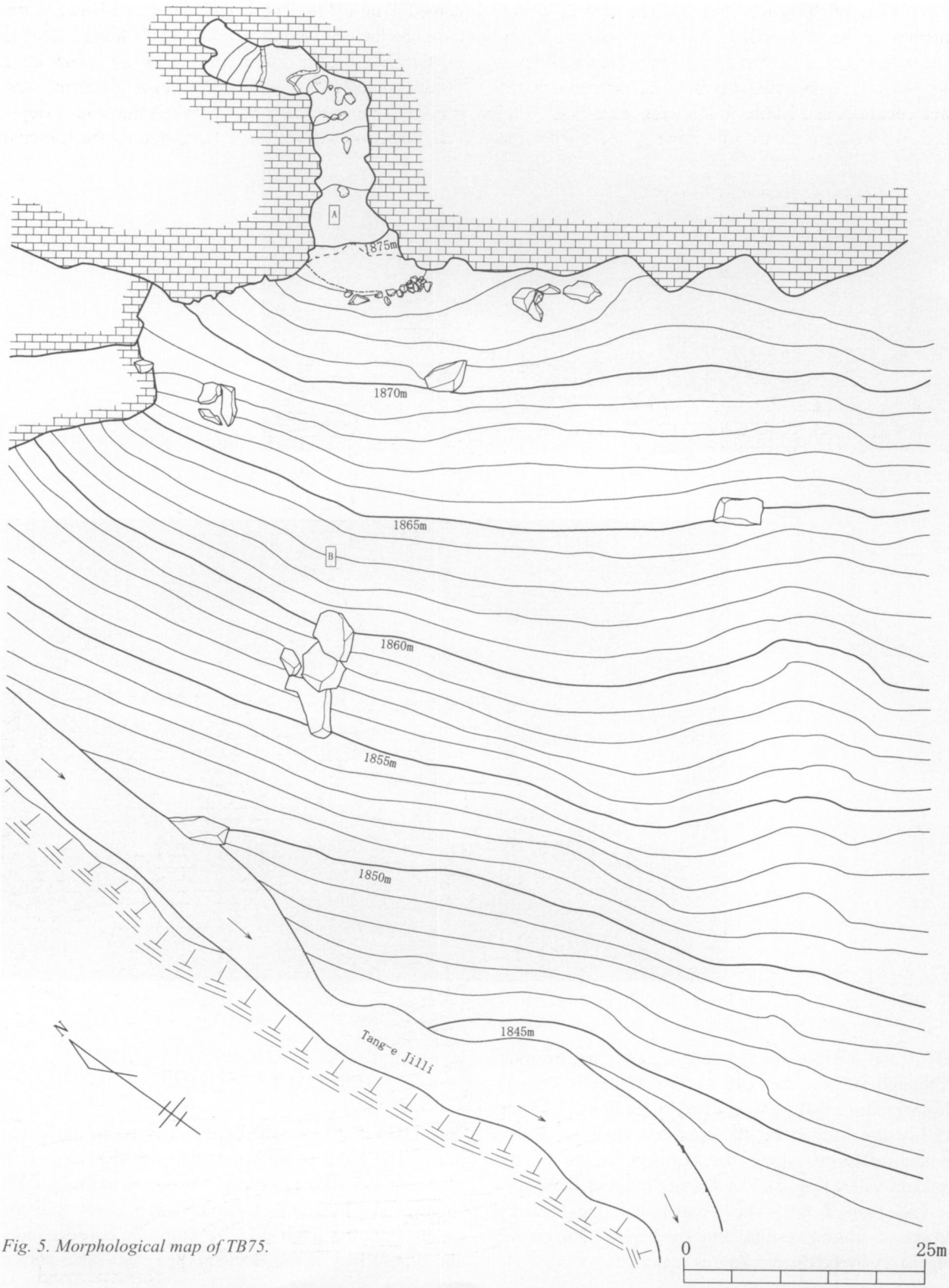

Fig. 5. Morphological map of TB75.

partial view of the south (Fig. 4). The altitude of the entrance to the cave is 1875 m. (Fig. 5). The opening measures *c.* 9 m. wide and 2.8 m. high, and the depth to the back of the main chamber is 19 m. Beyond this, the cave continues and climbs to the west, more than 15 m. (Fig. 6). The front terrace runs down to the small wadi, named Tang-e Jilli. The height difference between the cave and the wadi is over 30 m., and the terrace slope is relatively steep, having an angle of 20°. The large limestone rocks that have fallen down from the rear limestone mountain are distributed on the terrace slope. Islamic period potsherds and flint artefacts are scattered

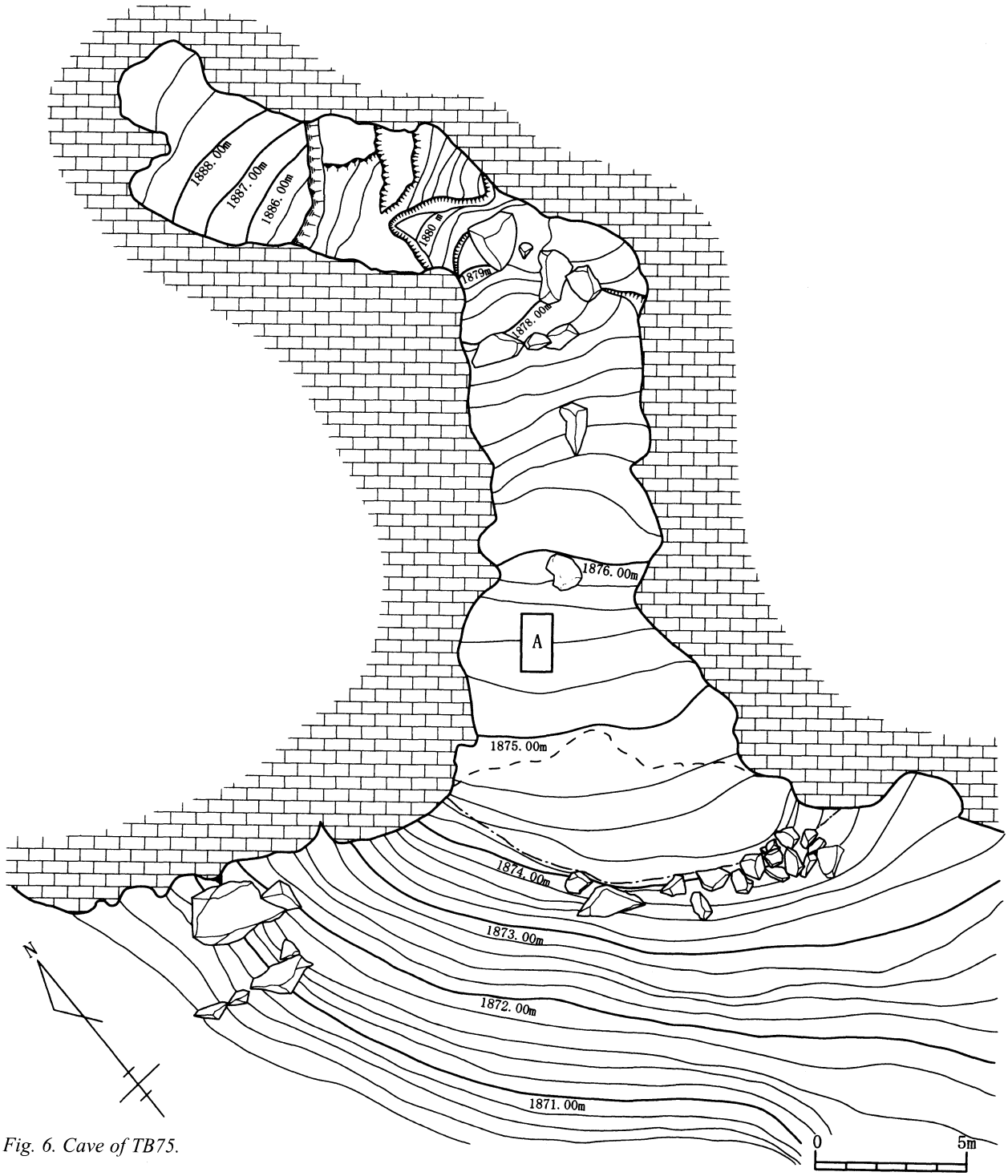

Fig. 6. Cave of TB75.

within the cave and on the terrace slope. In order to clarify the cultural sequence both within and outside of the cave, a small trench, measuring 2 × 1 m., was dug in each location (Fig. 5).

II.1. Trench A

A 2 × 1 m. trench was dug inside the cave, close to the front. The trench was located *c.* 2 m. inside from the line of the opening eaves and *c.*1.5 m. from the western wall of the cave (Fig. 6). The trench was excavated to a maximum depth of 1.5 m., but we did not reach the bedrock at this depth. Though the cultural deposits were divided into nine layers, they could be summarised into the following three cultural phases. The uppermost phase, consists of a series of ashy and brown soil layers 0.3 m. thick, and produced some Islamic glazed ware sherds, that most likely belong to the Islamic period. A hearth surrounded by cobbles was the only solid feature in this phase. The middle phase consists of many burned and grey soil layers, of about 0.2 m. in thickness. Some deep pits were dug from the level of this phase into the underlying deposits. These pits produced a great amount of material that dates from the Achaemenid era. The lowest phase, lower than the 0.5 m. from the surface of the cave floor, produced only prehistoric materials, especially lithic artefacts that were very similar to those found from Trench B. The characteristics of these lithic artefacts show that they belong to the period between the end of the Epi-Palaeolithic and the beginning of the Pottery Neolithic, i.e. the "Proto-Neolithic" as defined here. No potsherds were recovered in these lowest levels.

II.2. Trench B

Another 2 × 1 m. trench, sunk in the middle of the terrace slope, was dug 36 m. from, and along, the north-south axis of Trench A, between the 1863 m.–1862.5 m. contour line (Fig. 5). We reached the bedrock at 1.35 m. below the slope surface on the northern side of the trench and at 0.95 m. on the southern side. Therefore,

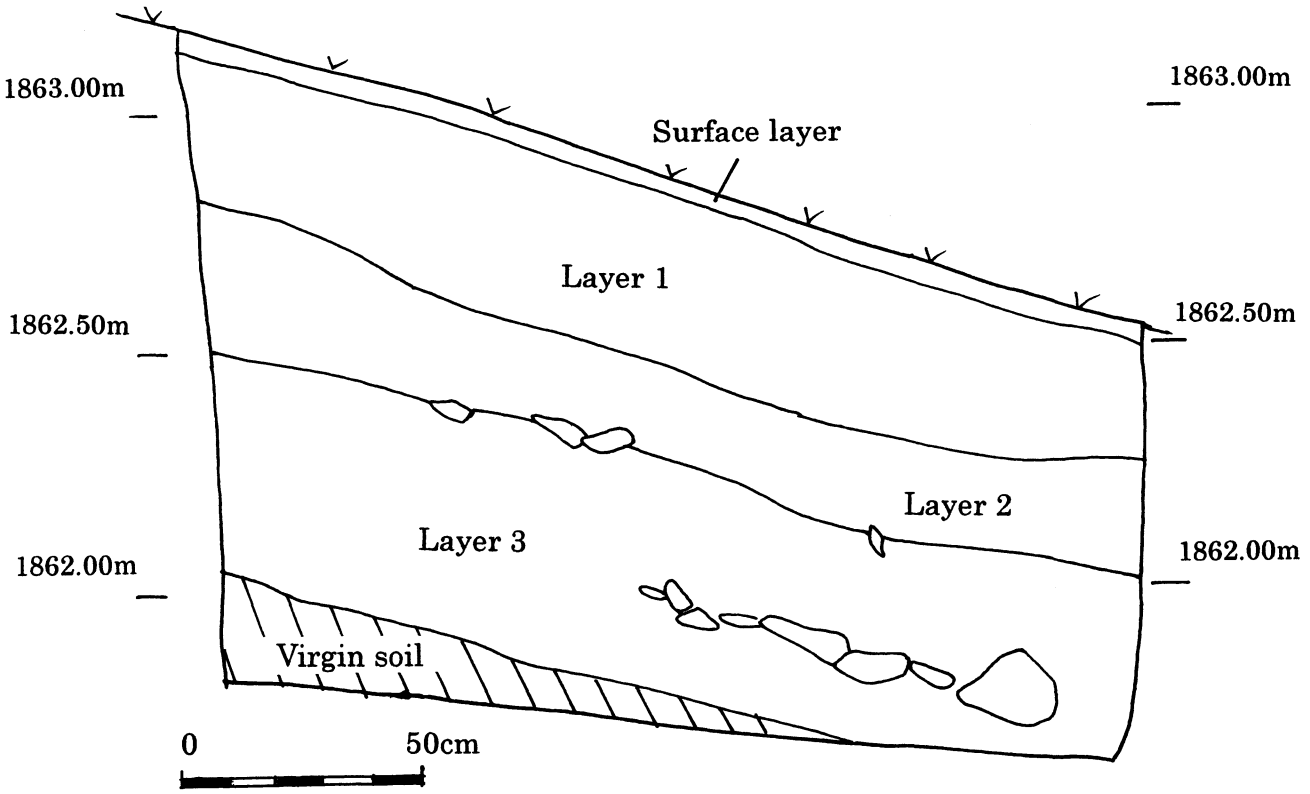

Fig. 7. Eastern section of Trench B at TB75.

the cultural deposits are about 1 m. thick in this part of the terrace slope. The deposits could be divided into three layers based on the colour and conditions of soil (Fig. 7). The uppermost, Layer 1, is ashy brown, measuring about 0.3–0.4 m. thick and containing whitish ash. The next layer (Layer 2) is 0.2–0.3 m. thick and is a reddish brown deposit, containing limestone pebbles. A crude floor-like feature made of limestone pebbles was observed at the bottom of this layer. Although the limestone pebbles are quite sparse for a stone floor, the terrace was partly levelled at the floor level, indicating that this structure seems to have been cultural. The lowest layer (Layer 3) is a red-brown soil with many limestone pebbles. It is the thickest deposit, about 0.4–0.5 m. thick, accumulated on the bedrock soil. Large pieces of limestone were spread unevenly throughout the deposit. Except the crude floor in Layer 2, no other structural remains were discovered.

II.3. Cultural Finds

In Trench A, the uppermost phase produced a limited amount of Islamic glazed ware potsherds. The second phase produced a great amount of large Achaemenid storage jar fragments. These jars have an orange-red fabric, and are grit and grog tempered, well fired, and sometimes have a grey slip on the exterior surface. Some body sherds have raised decoration. The lowest phase did not produce any potsherds. Fourteen potsherds were recovered from Trench B, and all of them came from the surface and Layer 1. Although some of them were prehistoric potsherds, most specimens were historic, especially Achaemenian. The number of potsherds is quite small, particularly compared with lithic artefacts recovered. It seems likely that Layer 1 contains material that has been re-deposited from higher up the slope. However, Layers 2 and 3 contain only "Proto-Neolithic" artefacts. It means that these layers were the original deposits or if re-deposition occurred, it occurred during the Proto-Neolithic period.

Trench A and B produced many lithic artefacts, whose characteristics are quite similar. The former produced 270 pieces and the latter produced 1583 pieces. Various kinds of green, grey, black and red chert-like flints were used as raw materials. A small number of obsidian microblades were also discovered, however no obsidian cores or débitage were found. The total amount of lithic artefacts unearthed from TB75 is summarised in Table 1. The most numerous chipped stones are microblades, measuring 2–5 mm. wide and less than 30 mm. long (Fig. 8: 1–3). Most of them have minute retouch or nibbling on one or both sides. This evidence indicates that these tiny microblades were used as elements of composite tools. Dozens of microblade cores were discovered from both trenches. They show various stages, from the initial pebbles to the final discarded cores. The most prevalent core types are single platform conical and prismatic shaped cores (Fig. 8: 5), regularly detached by pressure-flaking. In addition to cores, microblade core rejuvenation flakes, such as core tablets and bottom flakes, were frequently recovered. The presence of so many cores makes it likely that a large number of microblades were manufactured at TB75. The tools made from blades include backed pieces (Fig. 8: 4), notches (Fig. 8: 6), burins (Fig. 8: 7) and geometric microliths. For the production of larger and heavier tools, such as end-scrapers (Fig. 8: 8) and thumbnail-scrapers (Fig. 8: 9), both flakes and

TABLE 1. Total Amount of the lithic artefacts unearthed from TB75 and TB130.

TB75	1,853 pieces
Trench A	Surface (11), Layer 1 (4), Layer 2 (4), Layer 3 (0), Layer 4 (2), Layer 5 (3), Layer 6 (0), Layer 7 (141), Layer 8 (47), Layer 9 (58)
Trench B	Surface (3), Layer 1 (31), Layer 2 (404), Layer 3 (1,145)
TB130	3,419 pieces
Trench A	(2)
Trench B	Surface (83), Layer 1 (14), Layer 2 (41), Layer 3 (73), Layer 4 (403)
Trench C	Surface (2), Layer 1 (6), Layer 2 (116), Layer 3 (215), Layer 4 (238)?
Trench D	Surface (25), Layer 1 (145), Layer 2 (524), Layer 3 (492)
Trench E	Surface (90), Layer 1 (473), Layer 2 (410), Layer 3 (67)

Fig. 8. Lithic artifacts from TB75 (1–5, 8: Trench A—lowest phase, 6–7, 9: Trench B—layer 3, 10–11: Trench B—layer 2).

blades were used. Pointed pieces (Fig. 8: 10–11) were also discovered, although the number is quite limited. The inventory of lithic artefacts from Layers 2 and 3 of Trench B is shown in Table 2. It is immediately evident that microblades and the by-products of microblade manufacture comprise the majority of the chipped stone industry. The characteristics and chronology of this industry will be discussed below.

III. EXCAVATIONS AT SITE TB130

Site TB130 is located about 1.5 km. south-east of TB75. This shelter opens to the south-east and the view from the cave is much less open than TB75. The altitude of TB130 is 1848 m. and the height from the wadi bed is about 30 m. (Figs 9 and 10). The depth of TB130 is not so great. The shelter is 9 m. wide by 6 m. deep, and the height of the opening is about 9 m. (Fig. 12). The front terrace is steep like that of TB75, but relatively thick unnatural deposits were observed on the slope. Many small chipped stones were scattered on the terrace surface between the shelter and the wadi, and they indicated the existence of Epi-Palaeolithic/Neolithic cultural layers. One 2 × 2 m. trench (A) was sunk inside the shelter, and two 2 × 1 m. trenches (B, C) were sunk in the middle of the terrace slope along the north-south axis. Another 2 × 1 m. trench (D) was sunk 4 m. east of Trench B. As we discovered part of a stone floor in this trench, another 2 × 1 m. trench (E) was dug just north of Trench D. Therefore, the total excavated area measures 12 m.^{2}. All of these trenches, except Trench A, produced a considerable number of chipped stones.

IV. TRENCH A

A 2 × 2 m. trench was dug near the back of the shelter. However, we reached bedrock at a depth of only 0.3 m. from the shelter floor. The trench was full of white grey soft ash, modern animal dung and limestone pebbles. We did not find any archaeological objects in this trench, except a few modern potsherds. Therefore, we can conclude that either the shelter was only used by modern sheep herders, or that the old cultural deposits have been completely eroded away from the shelter.

IV.1. Trench B

A 2 × 1 m. trench was sunk into the middle of terrace slope at 1832.8–1832.2 m. altitude. The thickness of cultural deposits was about 0.7–0.6 m., and we reached the reddish terra-rossa brown virgin soil at an altitude of 1832.2–1831.5 m. The deposits consist of four layers (Fig. 13). The uppermost layer below the surface is a grey-brown layer, followed by a whitish limestone pebble layer, a grey ashy layer, and finally a reddish grey layer which is above the natural deposits. All of the layers were accumulated on top of the surface slope, and we could not recognise any structures or activities that

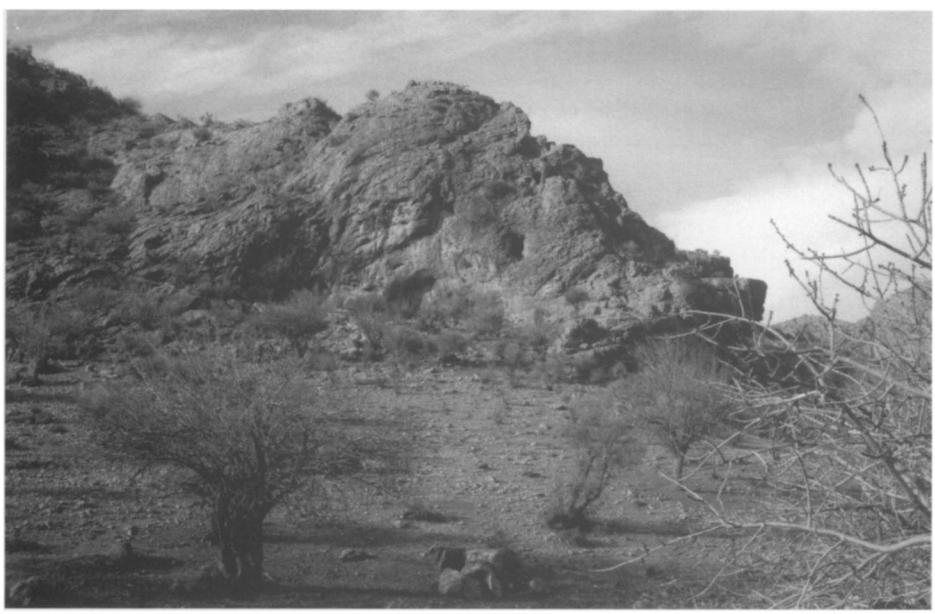

Fig. 9. View of TB130.

TABLE 2. Inventory of lithic artefacts from Layers 2 and 3 of Trench B, TB75. (Microblades in the present analysis are defined as blades with the width less than 10 mm. Fragments are broken flakes or the flakes with no clear feature. Core fragments are broken cores.)

	Lithic Inventory		TB75 Trench B Layer 2	TB75 Trench B Layer 3	TB130 Trench D Layer 2	TB130 Trench D Layer 3
debitage pieces	cortical flakes		5	2	1	
	partially-cortical flakes		4	12		
	non-cortical flakes	flakes	12	13	7	
		crested flakes	1			
		microblades	4	13	2	
broken debitage pieces		flakes			1	
		blades			1	
		crested flakes				1
		microblades		234	126	104
core rejuvenation flakes	core tablets		2	12	2	
	core tablets for microblade cores			1		
	change of orientation flakes			1		
	broken core bottom flakes			2		
	modification flakes of flaking surface			5		1
chips or retouch-flakes			36	406	303	290
	burin spalls				2	
	edge-rejuvenation flakes of end scrapers			1		
retouched pieces	retouched flakes		5	2		1
	retouched small flakes			2		
	retouched blades		1	2		
	retouched core tablets			1		
	notched pieces			1		
	notched blades			1		
	notched pointed blades			1		
	backed blades		2	1		
	pointed small flakes			4		1
	side-scrapers		2	2	4	1
	transversal scrapers				1	1
	end-scrapers		9	4	2	
	steep scrapers		3		1	1
	thumb-nail scrapers		1	5	5	2
	burins			1	1	
broken retouched pieces	used obsidian pressure micro-blades		1			
	retouched small flakes			4	5	
	retouched blades		2	2		
	notched small flakes			1		
	side-scrapers					1
	end-scrapers			3		
	thumb-nail scrapers				1	

microlithic tools	retouched microblades		2	4		
	notched microblades			2		
	lunates		1			
	atypical lunates		2			
	end-scrapers			1		
	burins			1		
broken microlithic tools	retouched microblades		3	4		
	inversely-retouched microblades			1		
	notched microblades			3		
cores	percussion-flaked cores	irregular cores for f	3	3	5	2
		conical cores for flakes		1		
		prismatic cores for blades		1	2	
	pressure-flaked cores	conical cores for m	4	2	2	1
		semi-conical cores for microbla		3		
		cylindrical cores for microblade		1	1	
		pyramidal cores for microblades				1
		prismatic cores for microblades		1		1
fragments			238	244	27	68
core fragments			61	128	21	15
total			404	1,145	524	492

levelled the slope. These layers, especially the lowest one, produced a large amount of lithic artefacts.

IV.2. Trench C

A 2 × 1 m. trench sunk into the terrace 2 m. south of Trench B, at an altitude of 1831–1831.5 m. The thickness, inclination, and characteristics of the cultural deposits are quite similar to those of Trench B. Moreover, the characteristics and composition of the lithic artefacts are very similar.

IV.3. Trenches D and E

Trench D was sunk into the terrace 4 m. east of Trench B. Therefore, the altitude of this trench is almost the same as that of Trench B. As we encountered part of a stone floor in this trench, another 2 × 1 m. trench, Trench E, was dug just north of Trench D. These two trenches formed one 2 × 2 m. trench. About 0.5 m. below the surface, a rough stone floor paved with many angular limestone pebbles was revealed (Figs 11 and 14). The section shows that this stone floor was laid down on a slightly levelled slope. As the floor extended out of the trench, we could not determine the shape of the feature. However, the northern edge of the floor seemed to be fringed with a row of large limestones. The floor surface is very rough, and it was probably used for working purposes, such as butchering or cooking, rather than for habitation. This stone floor was discovered in the third layer beneath the slope surface. All of these layers produced similar kinds of chipped stones. The thickness and characteristics of these three layers are also similar to those of Trenches B and C. As we stopped digging at the stone floor level, we did not reach virgin soil in Trenches D–E.

IV.4. Cultural Finds

As mentioned above, all of these trenches, except Trench A, produced a considerable number of lithic artefacts (N = 3419; see Table 1). The inventory of lithic artefacts from layers 2 and 3 of Trench D is shown in Table 2. The differences between the trenches and layers are quite small, and it can be said that the lithic artefacts of every layer belong to the same industry.

Microblades (Fig. 15: 1–5) are the most numerous artefact category among the chipped stone industry. As for retouched tools, small scrapers, including side-

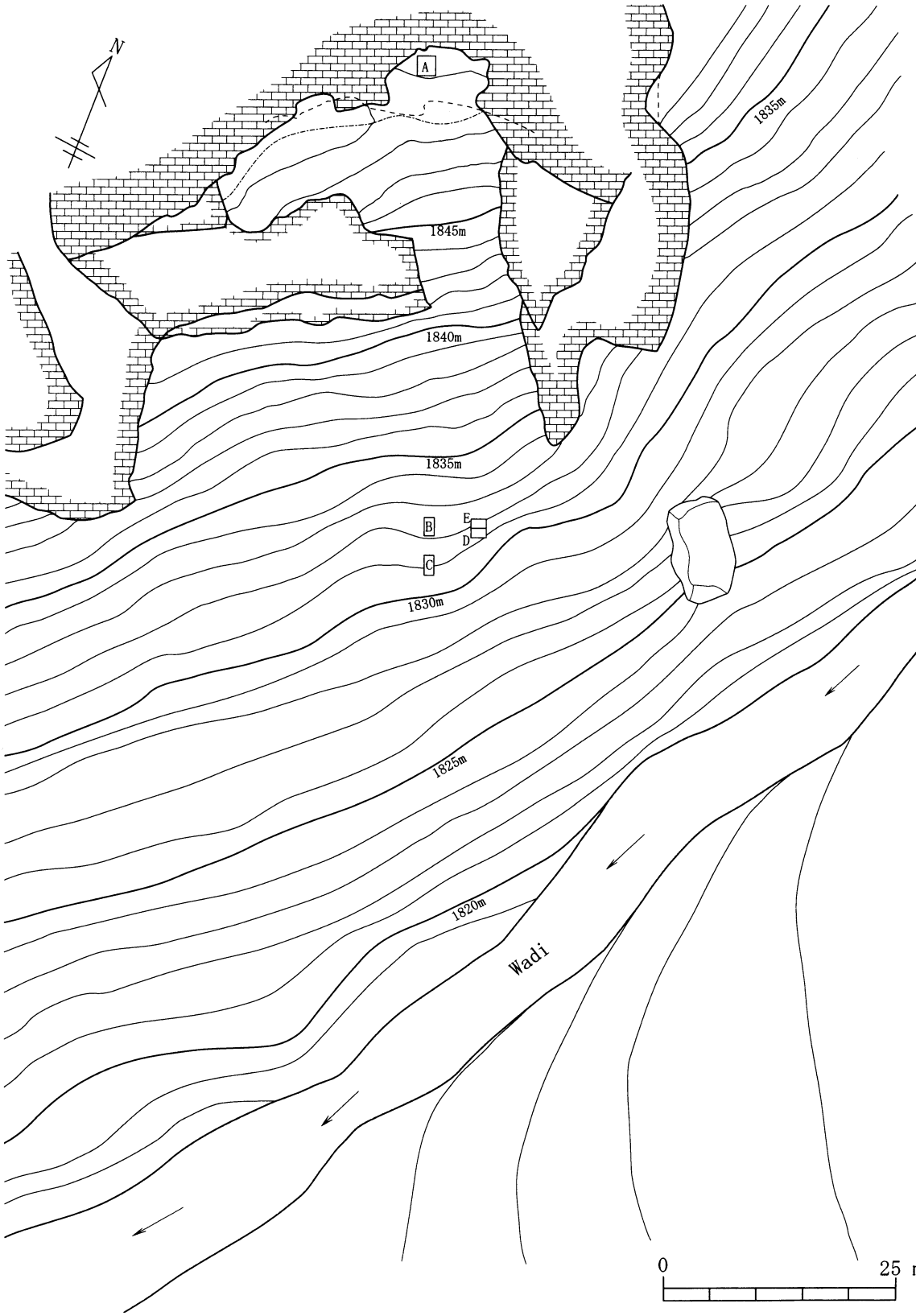

Fig. 10. Morphological map of TB130.

Fig. 11. Stone floor discovered in Trenches D–E at TB130.

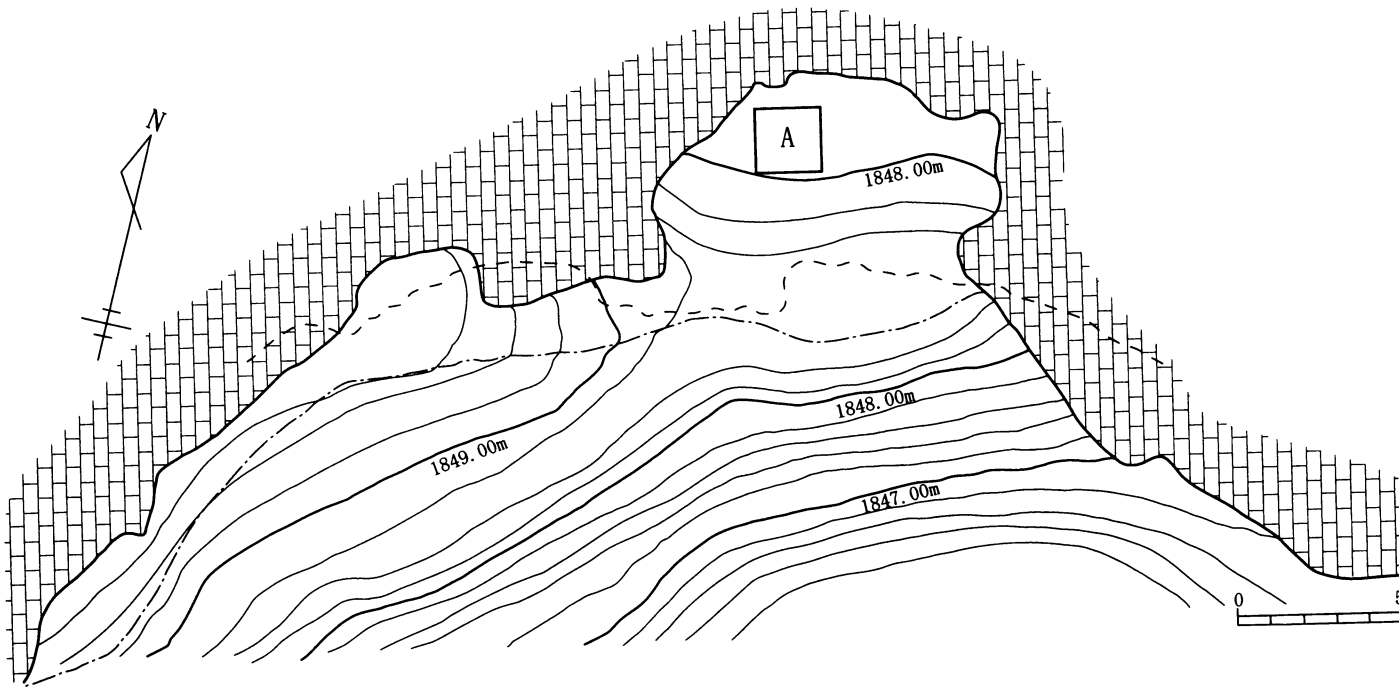

Fig. 12. Shelter of TB130.

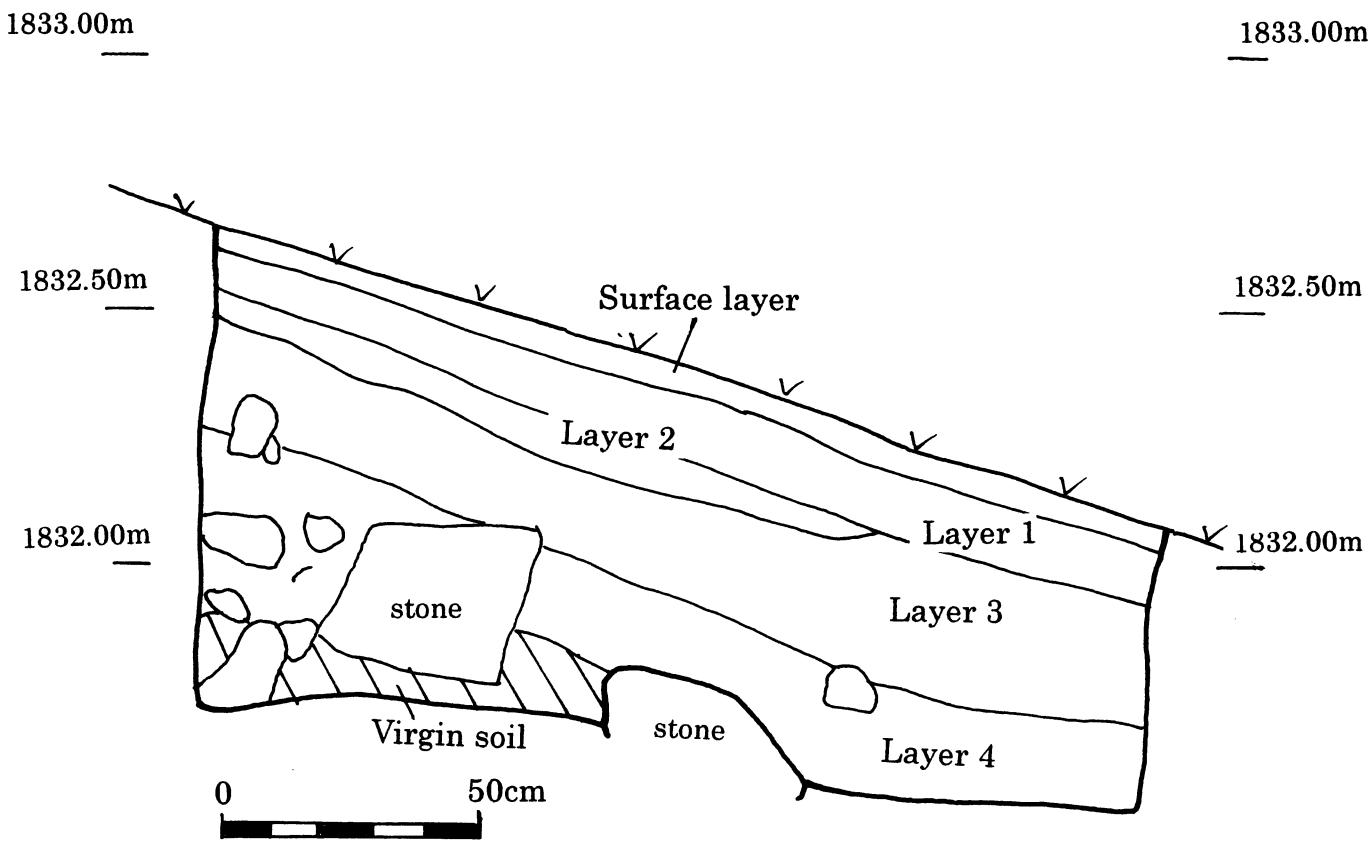

Fig. 13. Eastern section of Trench B at TB130.

scrapers, end-scrapers, steep-scrapers and thumbnail-scrapers (Fig. 15: 6–11) are the most common. Backed blades (Fig. 15: 12), geometric microliths including lunates and trapezoids (Fig. 15: 13–15), notches (Fig. 15: 16) and burins (Fig. 15: 17) were also recognised among the tools. Single platform conical, pyramidal and prismatic microblade cores were discovered in considerable numbers (Fig. 16: 1–6), and core rejuvenation flakes such as core tables (Fig. 16: 7–8) were also numerous. Besides the lithic artefacts, a few potsherds were also recovered. Trench B produced 14 sherd fragments. Four of them are probably Neolithic potsherds, including one typical Mushki painted ware rim sherd with light brown fabric, straw temper, painted in black on red slip. The other three Neolithic sherds are coarse plain ware. The other sherds are much later specimens. Trench C produced 22 sherds. Some Lapui red sherds were recognisable among them. These are rim and body sherds with buff-orange fabric, sand-tempered, red-slipped, and burnished on both surfaces. Most of the other potsherds are historic and modern specimens. Trenches D–E did not produce any potsherds. Almost all of the potsherds discovered in Trenches B and C came from the surface and upper two layers. Compared with the number of lithic artefacts, the number of potsherds recovered is extremely small. Moreover, on the basis of the relative dating of all of the material, this pottery, even the Mushki specimen, must date to a period later than all of the lithic artefacts. As with the material from TB75 Trench B, it seems likely that the upper layers at TB130 Trenches B and C that contain a mixture of pottery and lithic material have been re-deposited from higher up the slope. It is possible that the lithics from the layers without pottery could also have been re-deposited. However, it is notable that there is consistency in the lithic assemblages from the aceramic levels in each trench. This suggests that the lithic material from these lower layers may represent a coherent assemblage.

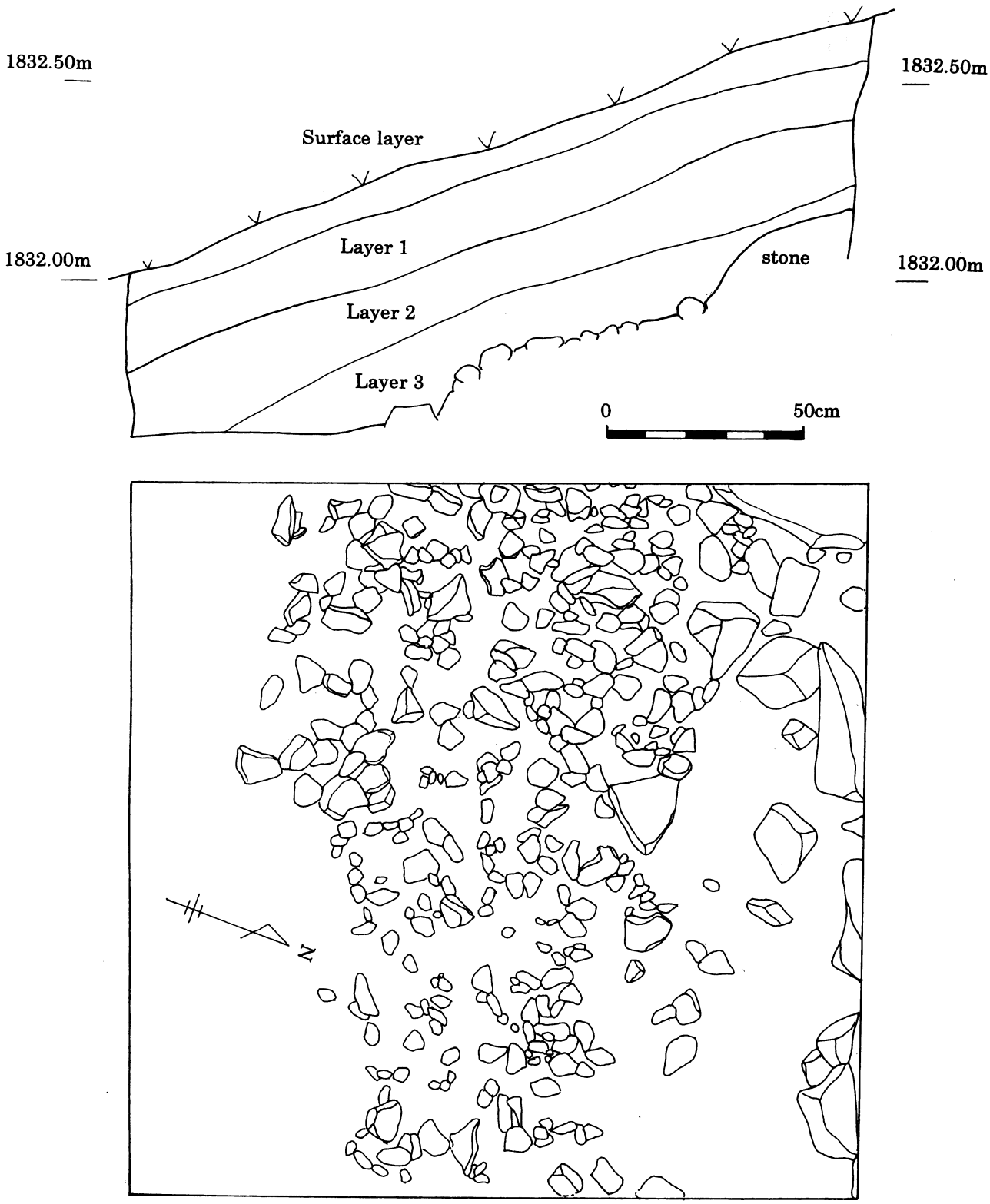

Fig. 14. Stone floor and western section of Trenches D–E at TB130.

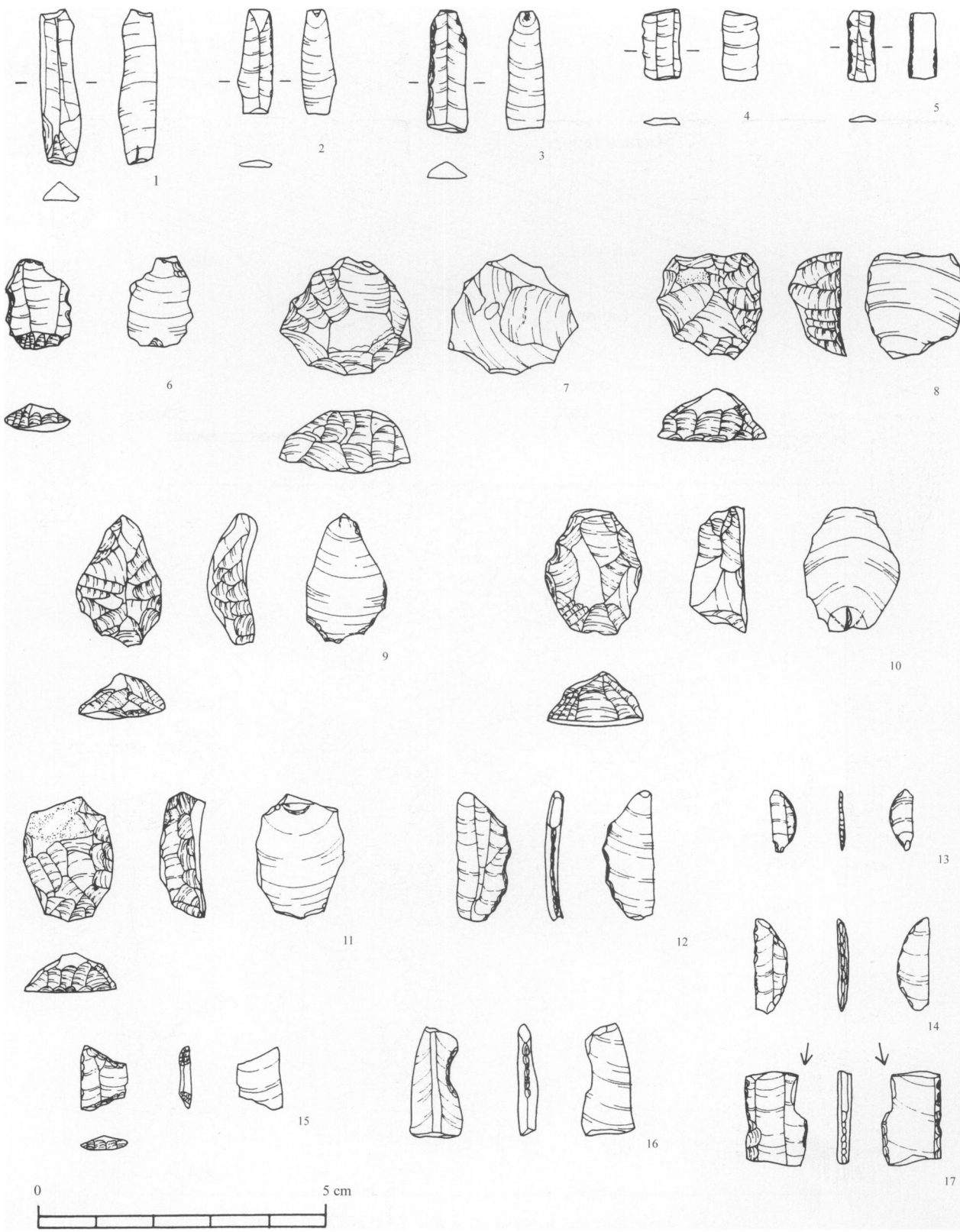

Fig. 15. Lithic artifacts from TB130 (1–5: Trench B—layer 4, 6: Trench D—layer 2, 7–8: Trench C—layer 2, 9: Trench B—layer 3, 10–11: Trench B—layer 4, 12: Trench B—layer 2, 13: Trench C—layer 4, 14–15: Trench E—layer 2, 16: Trench C—layer 3, 17: Trench D—layer 2).

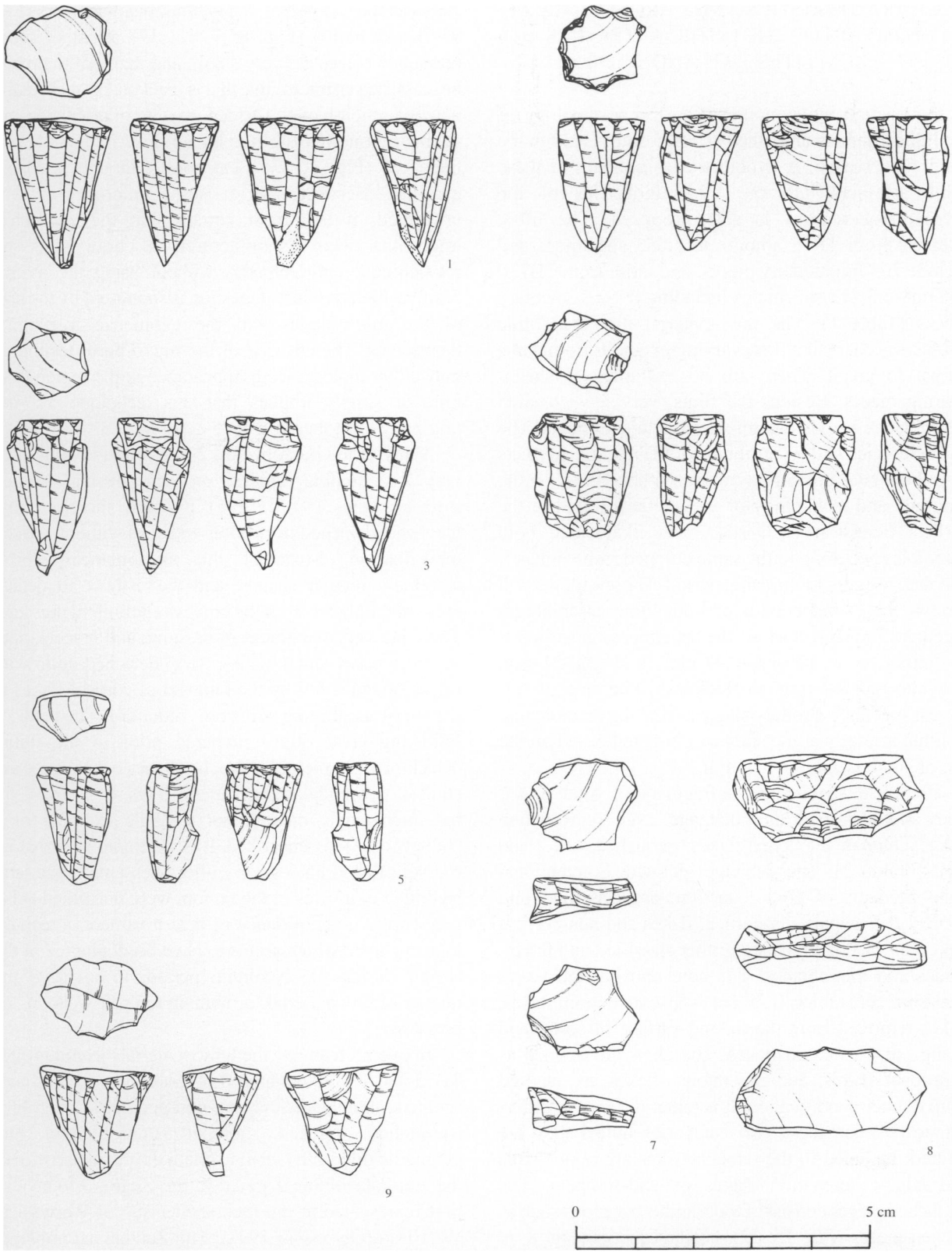

Fig. 16. Lithic artifacts from TB130 (1, 3: Trench D—layer 3, 2: Trench D—layer 2, 4–5: Trench B—layer 4, 6: Trench D—layer 3, 7: Trench D—layer 2, 8:Trench B—layer 4).

V. CHARACTERISTICS AND CHRONOLOGICAL POSITION OF THE LITHIC ARTEFACTS FROM SITES TB75 AND TB130

In this section we summarise the techno-typology of the lithic artefacts unearthed at TB75 and TB130 in the 2005 field season. A hypothetical placement of these lithic artefacts into the lithic industries of the surrounding regions is also proposed. The lithic artefacts from TB75 amount to 1,853 specimens and include 769 fragmentary pieces, and those from TB130 amount to 3,419 specimens including 896 fragmentary pieces (Table 1). The raw material for these lithic artefacts is chert-like flint, varying in colour from dark-brown to green. There are no examples of sheen-bearing pieces. Besides the flints, very few obsidian microblades are visible among the lithic artefacts. The characteristics and all attributes of these lithic artefacts from both sites are similar to each other. Based on the typology and technology of the artefacts found in the earliest layers at each site, it is likely that both assemblages belong to the same chipped stone industry and date roughly to the same period. Therefore, we will discuss the characteristics of both lithic assemblages together. The largest of all the specimens unearthed is an "initial" core, measuring 47 mm. in length, 24 mm. in width and 24 mm. in thickness. The size of this largest specimen strongly suggests that the manufacture of lithic artefacts at the sites was initiated based on the use of small sized raw material.

Complete specimens (unfragmented) total 3,607. They are classified into débitage, core rejuvenation flakes, chips or retouched flakes, retouched pieces and cores (Table 2). The débitage, defined as intentional flake products of core reduction, are classified into cortical flakes, partially-cortical flakes and non-cortical flakes, the last of which are further classified into flakes, blades and microblades. The core rejuvenation flakes consist of core tablets (Fig. 16: 7–8), core bottom flakes, flakes removed from the flaking surface of cores, and change of orientation flakes. The chips are defined as byproduct flakes, and the retouch-flakes are derived from retouch modification. It is rather difficult to differentiate between these two categories unless they are refitted. Included in the retouch-flakes are burin spalls and edge-rejuvenation flakes of end-scrapers. The retouched pieces consist of tools and/or weapons such as backed pieces (Fig. 15: 12), notched pieces (Fig. 8: 6, Fig. 15: 16), side-scrapers, end-scrapers (Fig. 8: 8), steep-scrapers (Fig. 15: 7–11), thumbnail-scrapers (Fig. 8: 9) and burins (Figs 8: 7, 15: 17). Most of these retouched pieces are very small, and many of them can be classified as microliths, that is, backed, retouched and notched microblades. Added to the microblades are geometric microliths of the lunate (Fig. 15: 13–14) and trapezoid (Fig. 15: 15) categories, though small in quantity. Because not a single micro-burin was unearthed, it is almost certain that the geometric microliths were manufactured at both sites by retouching on microblades without using the micro-burin technique. This suggestion is supported by the size of the microblades and the geometric microliths themselves. The absence of the micro-burin technique may either indicate its disappearance in the region over time or simply implies that this technique did not originally exist there.

Many of the microblades, 2 to 5 mm. in width, bear very fine, minute retouch, probably having resulted from use (Figs 8: 1, 15: 3,5). It seems, therefore, that they were detached from cores and used without retouch modification. Most of the microblades exhibit extremely regular shapes, and the manner to detach these microblades from the core was definitely pressure. There are very few traces of cresting, and it seems that in most cases microblades were detached following ridges on cores left by the removal of cortical flakes at the very beginning of core reduction, instead of following crest ridges prepared prior to the initial detachment of microblades. The shapes of the cores are conical, pyramidal and prismatic (Figs. 8: 5, 16: 1–6), but interestingly enough not a single example of a "bullet" core was unearthed. It is worthy to note that no pressure-flaked blades, very often seen among the later Neolithic industries in the region, were unearthed. Also noteworthy is the absence of heat treatment, a technological choice which seems to have been adopted in the region during the Neolithic period, to improve the quality of raw material for making tools or weapons by pressure.

In overall features, the lithic materials from the sites TB75 and TB130 composed of tool types, such as end-scrapers, thumbnail-scrapers, non-geometric microliths (retouched, backed, notched microblades) and geometric microliths seem to retain the characteristics of the Epi-Palaeolithic Zarzian in the Zagros Mountains, best represented at the rock-shelter site of Warwasi in West Iran (Olszewski 1993). The Zarzian assemblages at Warwasi were analysed by Olszewski, who grouped

them into four stratigraphical units. According to Olszewski, the lithic artefacts commonly seen in these units are non-geometric microliths, notch/denticulates, and thumbnail-scrapers. Micro-burins appear in Unit 2 (the second earliest unit) in association with geometric microlithis (Olszewski 1993). Illustrations of blades and microblades demonstrate that pressure flaking was not employed in their detachment from single-platform or opposed-platform cores (Olszewski 1993: 208; Fig. 8: 1). Contrary to the Zarzian assemblages at Warwasi, elaborate pressure flaking was employed at TB75 and TB130 to detach microblades. This is a major technological element that differentiates our materials from the Zarzian industries.

Although differences in the artefact inventories between TB75 and TB130 are now under study as are inter-layer differences, both materials might be tentatively placed within the temporal framework spanning from the microlith dominated "Zarzian tradition" to some part of the "Proto-Neolithic" where there was the use of pressure technology.

For the time being, we do not have absolute dates from our sites and we must take a relative dating approach. However, the TB75 and TB130 materials can be compared with the "Proto-Neolithic" along the Zagros flanks of North Iraq, whose stone industries have been well documented with clear stratigraphy. They are represented by those of the open-air sites at Zawi Chemi Shanidar, Qermez Dere, Nemrik 9, M'lefaat, Karim Shahir and Maghzaliyah. Their artefact inventories are outlined below.

Zawi Chem Shanidar is located in the Shanidar valley, on the left bank of the Greater Zab River, north-east of Mosul (Solecki 1981). Layer B of this site, dated to 8,920 ±300 B.C. by radiocarbon determinations, was associated with a circular stone architectural feature measuring 2 m. in diameter, and the lithic artefacts consist of backed blades, denticulated pieces, notched pieces, truncated pieces, borers, side-scrapers, pièces esquillées and geometric microliths of the lunate category. Neither sheen-bearing pieces nor micro-burins were reported. The published photographs of the cores demonstrate that the blades and microblades were not detached by pressure.

Qermez Dere is located in the north-west outskirts of the town of Tell Afar west of Mosul (Watkins *et al.* 1991). Seven settlement phases confirmed at this site were grouped into three stages: the oldest stage (Phases 7 and 6) must be placed in the transition from the Epi-Palaeolithic to the Neolithic periods, the middle stage (Phases 5 and 4) without any Epi-Palaeolithic features and belongs to the early Pre-Pottery Neolithic period, and the youngest stage (Phases 3 and 2) also belongs to the early Pre-Pottery Neolithic period. Except for some geometric microliths and micro-burins from the oldest stage and the "Nemrik point" from Phase 4 onward, the lithic artefacts bear the same features through all the phases, mainly consisting of notched pieces, denticulated pieces and Khiam points. The published illustrations of the cores (Watkins *et al.* 1991; Fig. 8: 4) demonstrate that pressure flaking was employed to detach blades and microblades in the youngest stage at the latest.

Nemrik 9 is located in the southern part of the Dohuk governorate, north-north-west of Mosul. Three settlement phases confirmed at this site were placed in the Pre-Pottery Neolithic period. Radiocarbon dates place the oldest phase to the ninth millennium B.C., the middle phase to the eighth millennium, and the youngest phase to the end of the eighth millennium through the first half of the seventh Millennium B.C. (Kozlowski and Kempisty 1990: 349–50). The lithic artefacts show essentially the same features throughout the settlement phases, that is, retouched blades, end-scrapers, tanged points called "Nemrik" points and microliths such as backed microblades. Neither geometric microliths nor micro-burins are reported (Kozlowski and Szymczak 1990). It is stated that the blades were detached with the aid of punches in the oldest phase and that they were detached by pressure from the middle phase onward (Kozlowski and Kempisty 1990: 350)

M'lefaat is located north-east of the Tigris-Greater Zab junction on the west bank of the river Khazir, east of the plain of Mosul (Dittemore 1983). Lithic artefacts such as notched pieces, microblades with use-nibbled edges, scrapers and perforators were unearthed from three stone made floors, 4 × 3 m. in area. These floors were dated to between 8,900 and 8,600 B.C. (Howe 1983: 130–31). Neither geometric microliths nor micro-burins are reported. Parallel ridges and edges, and consistent width of the microblades, demonstrate that pressure flaking was employed to detach the microblades at this site (Dittemore 1983: 673–74).

Karim Shahir is located east of Chemchemal in the province of Kirkuk (Howe 1983). An enormous amount of lithic artefacts were unearthed from a single occupation floor composed of stone pavement and pits in the area of 500~600 $m.^2$. This floor was dated to between 8,900 and 8,600 B.C. (Howe 1983: 130–31).

The lithic artefacts consist of backed microblades, drills, end-scrapers, side-scrapers, obliquely truncated pieces and many notched pieces. Because geometric microliths of true category were not included, the micro-burins from this site are considered as the by-products from the manufacture of obliquely truncated pieces, unrelated to the micro-burin technique. Most of the blade or microblade cores are conical in shape, and their published illustrations (Howe 1983: figs 20, 21) demonstrate that elaborate pressure flaking was employed to detach microblades.

Maghzaliyah is located some 12 km. west of Tell Afar (Bader 1993). Strata 2 to 4 yielded several rectangular houses. The lithic artefacts are made on obsidian, except in the uppermost Stratum 4 with flint artefacts slightly increasing. These lithic artefacts bear almost the same features throughout the strata, consisting of scrapers, end-scrapers, borers, tanged points, large flakes used unhafted as sickle blades, and segmented blades to be inserted into sickles. Geometric microliths are very rare. Blade cores are conical in shape or "bullet-shaped". Very regular flake scars on the cores demonstrate that the blades were elaborately detached by pressure flaking.

Apart from the "Proto-Neolithic" of North Iraq briefly reviewed above, important material, comparable to TB75 and TB130 material, was recently reported from the Zagros Mountains in the province of Luristan, West Iran. Roustaei and others carried out Palaeolithic surveys there, and they published a report which mentioned the Vare Zard site complex, a series of rock-shelters with a scatter of Epi-Palaeolithic and "Proto-Neolithic" artefacts extending for more than 200 m. along the site complex on a cliff slope (Roustaei *et al.* 2004). Although these artefacts were collected during surveys and not acquired through excavation, they seem to show a definite stone industry. Illustration of the selected artefacts of this site complex interestingly shows a strong similarity with our materials, both being characterised by notched blades/microblades, end-scrapers, borers and side-scrapers. Blades and microblades were elaborately detached with parallel ridges and edges, and microblades at least were detached by pressure flaking. Some of the conical microblade cores with regular flake scares can be considered "bullet" cores (Roustaei *et al.* 2004: 705, fig. 11).

In Fars province, especially the Marv Dasht plain, many Palaeolithic cave sites have been discovered. Some of them, such as Eshkaft-e Gavi, were excavated (Rosenberg 1985), and the Upper Palaeolithic lithic assemblage was roughly detected. Epi-Palaeolithic caves were extensively surveyed in the Marv Dasht plain, and at least 11 cave sites, including a large cave site named "KMC", produced typical late Zarzian lithic assemblages (Rosenberg 2003).

Many Pottery Neolithic tappehs have now been excavated, in Fars province especially again in the Marv Dasht plain. The excavations at the sites, such as Tal-i Mushki and Jari B, revealed the earliest phases of the

TABLE 3. A Hypothetical Placement of the TB Sites in the "Proto-Neolithic" of the Zagros Flanks on the Basis of Presence of Geometric Microliths and Pressure Flaking of Microblades (modified from Ohnuma 1997: fig. 5).

WEST		**EAST**
Micro-burin technique • • • • • • • • →		< **Epi-Palaeolithic Period** >
		Zawi Chemi Shanidar
Qermez Dere Phase 7		
Qermez Dere Phase 6		
• •	*Geometric microliths*	• •
Qermez Dere Phase 5		**TB75 and TB130**
Qermez Dere Phase 4	Nemrik 9 Oldest Phase	← • • • • *Pressure flaking of microblades*
Qermez Dere Phase 3	Nemrik 9 Middle Phase	M'lefaat Karim Shahir
Qermez Dere Phase 2	Nemrik 9 Youngest Phase	
	Maghzaliyah	
• •	*Pottery*	• •
		< **Pottery Neolithic Period** >

Pottery Neolithic period in the same region (Fukai *et al.* 1973; Masuda 1986). Re-excavations on these early Pottery Neolithic sites have recently focused on chronological clarifications (ex. Alizadeh *et al.* 2004; Alizadeh 2006). Some newly investigated Pottery Neolithic sites, such as Toll-e Bashi and Kushk-e Hezar (Abdi *et al.* 2003, Alden *et al.* 2004) have also shed new light on this phase. The late Zarzian lithic assemblage collected at "KMC" consists of geometric microliths, such as lunates, curved backed bladelets, scalenes and quadrilateral pieces, end-scrapers and thumbnail-scrapers with many blades and blade cores (Rosenberg 2003). The lithic assemblage discovered from Tal-i Mushki, the earliest Pottery Neolithic site in this region, consists of blades, denticulations, notched blades, lunates, trapezoids, scrapers, borers and others. Many sickle elements were also included in this assemblage (Fukai *et al.* 1973).

VI. CONCLUSION

Taking all of the forgoing matters into consideration, we tentatively place the lithic artefacts from Sites TB75 and TB130 to some point in the "Proto-Neolithic" framework of the Zagros mountains: particularly close to the Qermez Dere Phases 5 and 4, Nemrik 9 Oldest Phases, and perhaps M'lefaat and Karim Shahir, on the basis of the presence of geometric microliths and pressure flaking of microblades (Table 3). This is primarily due to the general characteristics of the lithic artefacts, i.e. the existence of the pressure flaking technique, the absence of the micro-burin technique, and the absence of sickle elements. This is an indication of the existence of a transitional phase to the Neolithic societies in the Eastern Zagros.

Some attributes of the lithic assemblages of TB75 and TB130 are common to those of the late Zarzian, and some other attributes are common to those from Mushki. Despite this, the differences are much greater than the similarities between these assemblages, suggesting that the TB75 and TB130 assemblages are coherent in and of themselves. As mentioned at the beginning of this report, the transition between the end of the Epi-Palaeolithic and the beginning of the Pottery Neolithic remains as a strange hiatus in the eastern Zagros, and no other lithic assemblages identical to those of TB75 and TB130 have yet been found in the eastern Zagros. We must progress with this project to the next step in order to determine how the Eastern Zagros might have played a role in this important transition just as the western Zagros region did.

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